

On the supposed Duplicity of the First Satellite of Jupiter.

By A. Stanley Williams.

With reference to the remarkable apparent duplicity of the First Satellite of *Jupiter* observed by Mr. Barnard on September 8, 1890, and of which he gives an account in the *Monthly Notices*, vol. li., p. 547, I would ask whether it is quite certain that the observed phenomenon may not have been due to the satellite being seen in transit as a dark spot close to a dark spot on the surface of *Jupiter*. Such an explanation would, of course, be out of the question in the case of an observer of so much experience as Mr. Barnard, if the observation could have been continued during a considerable part of the time that the satellite was on the disc of the planet, since the difference in the rate of motion of the two spots could not in such case have escaped being noticed. But Mr. Barnard expressly states that the observation was interrupted, and that it was not possible to follow the satellite closely owing to the presence of visitors. And the explanation now suggested assumes greater probability when considered in connection with the observation referred to below, since it will appear that there was actually a little spot on the surface of the planet exactly in the position necessary to give rise to the observed duplicity. The explanation ingeniously set forth by Mr. Barnard in his note on p. 557 of vol. li. of the *Monthly Notices* appears to me inadequate to account for the observed appearance, since it would require the satellite to be much larger than it actually is.

On September 5, 1890, three days before Mr. Barnard's observation, *Jupiter* was observed by the writer with a $6\frac{1}{2}$ -inch Calver reflector, powers 150 and 225. A little dark spot was noticed in the middle of the bright equatorial zone, exactly in the position of the southernmost component of the double spot represented by Mr. Barnard in his figure (Plate 14, fig. 4). The spot was slightly oval in shape, and about $1''$ in length. It was observed to be in mid-transit at $8^h 42^m.8$. It therefore followed the zero meridian of System I. of Mr. Marth's Ephemeris (*Monthly Notices*, vol. l., p. 346), by $3^h 30^m.7$. The motion of the markings in the equatorial region of *Jupiter* agreed closely last year with this ephemeris, so that in an interval of a few days there would be no appreciable difference.* The little dark spot would therefore have transited at $15^h 26^m.7$ G.M.T. on September 8. According to the *Nautical Almanac* the

* The above spot was so small and delicate that, in the unfavourable position of the planet last year, it could not be continuously observed. But a little preceding it was another similar, but larger and plainer, spot, and the

first satellite was in mid-transit on that night at $15^h 27^m$, and it would be seen projected on the bright surface of the equatorial zone just north of the planet's equator. Consequently, when in mid-transit, the satellite would have been seen as a dark spot just north of the above-mentioned spot, and the two would have appeared as a close double spot. In other words, the appearance would have been almost exactly that represented by Mr. Barnard in fig. 4, Plate 14. Whether this explanation be considered sufficient or not, it appears to me very important that the presence of this little dark spot should be placed on record.

In conclusion, I may mention that the first satellite was visible in dark-transit on July 26, 1890, in nearly the same position relative to the belts as the northernmost of the two spots shown in Mr. Barnard's sketch, but a little nearer to the equator. Since the elevation of the earth above the plane of *Jupiter's* equator was $-0^\circ.297$ on July 26, compared with $-0^\circ.402$ on September 8, the position of the satellite on the latter date should have agreed very closely with that of the northernmost of the two spots in fig. 4, Plate 14.

Burgess Hill:
1891 November 7.

(Note on some Photographs of Jupiter taken with the Five-foot Reflecting Telescope. By A. A. Common, LL.D., F.R.S.)

A new mirror for the 5-foot telescope was completed in July, and some experiments have been made in photographing *Jupiter* to determine the exposure necessary and the definition obtainable. With the primary image a good picture is obtained with the quickest exposure that can be given by hand. About 2^s gives a dense image and all the visible satellites, with an enlarging lens giving an image of about $\frac{1}{2}''$ 3^s to 6^s gives ample density, up to 1 inch from 8^s to 10^s gives sufficient density. For further enlargement the time is, of course, proportional. About $1\frac{3}{4}$ -inch diameter is the largest we have tried, but this was done on an unfavourable night.

following observations of it will show that its motion did not differ greatly from Mr. Marth's System I. :—

Date.	G.M.T. of Transit.	Longitude. System I.
1890.	h m	°
Aug. 1	11 46.5	111.4
3	13 5.8	115.8
Sept. 9	10 55.6	121.1
Oct. 9	9 23.2	119.9
12	6 20.5	121.9

It was also seen on September 5, but the time of its transit was not recorded.